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HAMMERMILL PAPER COMPANY

July 12, 1963

Mr. Clayton E. Schulze, General Manager
American Chloride Company
1952 Zimmarly Road
Eric, Pennsylvania

Dear Clayton:

Thanks for your letter of July 9 and enclosures.

In proceeding with this deep well disposal proposition we had very much in mind the theoretical possibility of the migration of the discharge effluent from the Bass Island horizon to any other stratum. The possibility of any such migration, however, was, in the opinion of geologists, eliminated by the findings of the evaluation well especially the pressure in the Bass Island Limestone.

I think you and your people would be very much interested to go over some of the material which we have in regard to the well which is the subject of the application to the Sanitary Water Board. A great deal of this material was attached to our application and also discussed with the State Geologist. Why don't you call me and set up a date to discuss the whole matter? I should be glad for you to meet our technical personnel who are involved so that you and your associates feel free to carry on any discussions with them directly.

Best personal regards.

Sincerely,

MEG/epk

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#1 well

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Hammermill Info.

Change # 7

PROPOSED DISPOSAL OF PULPING
WASTES INTO HAMMERMILL NO. 3 DEEP WELL

Submitted by
Hammermill Paper Company
Erie, Pennsylvania

AR101977

Waste Disposal Proposal For Disposal Well #3

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I. HAMMERMILL'S DISPOSAL PROGRAM

NO. 1 WELL - On June 10, 1963, Hammermill Paper Company applied for a permit relative to the disposal of industrial wastes by injection into a well specially drilled and constructed for this purpose. The Board acted favorably on this application and granted permit No. 363110 dated August 14, 1963 for this purpose. In the opinion of our consultants, Dow Chemical Company, the construction of Hammermill No. 1 deep disposal well utilized the best techniques and materials available at the time.

A report accompanying the application, entitled "Proposed Disposal of Pulping Wastes by Deep Well Injection", reviewed in detail the origin of Hammermill's disposal problem and its proposed solution by deep well injection. Exhibits were presented detailing the theory and geology of deep well disposal and well construction techniques. These are incorporated by reference into this report.

~~The initial injection of spent pulping liquor into Deep~~
Well No. 1 was made ~~on April 24, 1964~~. On October 26, 1964, Hammermill Paper Company submitted a report to the Secretary of Health in Harrisburg attesting to the efficiency and adequacy of the waste disposal facility. The report indicated that the injection pressures and records showed the originally projected capacities to be valid and that the waste liquor had been contained in the injection strata.

~~Additional evidence as to the containment of waste in the injection strata, gained through the drilling and evaluation of Deep Well No. 2 was submitted as further proof that no migration had taken place.~~

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230,938,000 gallons of spent pulping liquor had been injected into No. 1 well by April 14, 1968. On April 14, 1968 a failure occurred caused by corrosion of the injection tubing. The details of failure and its repair were spelled out in the May 17, 1968 application for a permit to reuse No. 1 Well.

NO. 2 WELL - The drilling, testing and completion of Hammermill No. 2 was done under the supervision of Dow Chemical Company, the contractor and consultant during the operation. The results gained through the drilling and testing of Hammermill No. 2 indicated that:

1. ~~The Bass Island formation is better developed than in well No. 1 and should take 500 to 600 gpm of effluent.~~
2. Cambrian formations (and deeper) do not show the same development for effluent disposal at this location as has been found south of Erie, Pennsylvania (25 miles) and in Canada. The Gatesburg formation is poor, the Mt. Simon formation is relatively thin (15') and no basal conglomerate was encountered which might provide large capacity for effluent disposal. The mica schists and Mt. Simon indicated some capacity for receiving effluent.
3. The well should serve as a safe effluent disposal well because of completion procedures, impermeable horizons above the disposal zones, and pressure characteristics of the disposal zones.

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Application for a permit for disposal of spent pulping liquor by injection into No. 2 well was made on March 19, 1965. The Board acted favorably on this application and granted permit No. 36515 dated July 30, 1965 for this purpose.

Well No. 2 was placed in operation in September, 1965. 259,373,000 gallons had been injected into the well through May 19, 1968. ~~Until April 14, 1968 both No. 2 and No. 1 wells were used for the injection of spent pulping liquor.~~ From April 14, 1968 to the present, all of the spent pulping liquor has been injected into No. 2 well.

SURFACE FACILITIES - The operation of Hammermill No. 1 and No. 2 disposal wells has led to the development of a satisfactory treatment program to make spent pulping liquor suitable for deep well injection. Basically, the system consists of the removal of suspended particulate matter from the spent liquor by means of precoated pressure filters followed by a secondary treatment through a cartridge type filter.

In the filtration process, particle removal is carried out down to as small a size as is economically feasible and practical.

Exhibit H is a schematic diagram showing the system used to handle Hammermill Paper Company's spent pulping liquor.

In the process, spent pulping liquor is collected from the blow pits and the continuous digester and held in large storage tanks. The liquors are blended together prior to pressure leaf filtration and held together in a surge tank prior to final polish

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filtration and pumping to the injection pumps. The development of the process has been covered in previous reports.

No. 2 well is equipped with injection pumps having a total capacity of 831 gallons per minute. The injection pumps are horizontal cylinder triplex positive displacement type pumps. The design has proven satisfactory in service on wells 1 and 2.

Piping will be installed to permit the present No. 2 well pumps to pump to either No. 2 or No. 3 well. The location of No. 3 well, approximately 625 feet west of No. 2 well was selected so the pumps could service both wells. The total pumping capacity for injection into the three wells will be 1,219 gallons per minute. Experience has shown that this is more than sufficient to handle all of Hammermill's spent pulping liquor wastes.

II. ADDITIONAL FACILITIES

NO. 3 WELL - To provide a wide margin of well capacity for injection and in line with suggestions from the Pennsylvania Department of Health well ~~No. 3~~ has been drilled and perforations made into the Bass Island formation. ~~Injection tests have shown that the well will take more liquid than either well 1 or 2.~~ Well No. 3 should take 600 to 800 gpm of spent pulping liquor. The Completion Report on Disposal Well No. 3 is presented in Exhibit A. "The Chronological Drilling Summary" is given in Exhibit B with Exhibit C being the "Hammermill No. 3 Casing and Formation Diagram." Exhibits D, E, F and G present the "Bondstrand Liner Casing Specifications", "Analysis of the Brine from Hammermill Well No. 3", "Cementing and Treatment Reports", and "Well Logs".

Exhibit C, Hammermill No. 3 Casing and Formation

Diagram, schematically shows the proposed construction of the well. The injection pipe will be a 5" fiberglass pipe which will be encased in an acid resistant cement. The cement will be injected into the 5" fiberglass pipe down to a temporary bridge plug and then will be forced up the annulus between the 5" and 7" pipes. Centralizers will be installed to ensure a uniform envelope of cement between the two pipe strings. After curing, the slump at the top of the annulus between the strings will be filled with grouting to the surface.

The fiberglass injection pipe is manufactured by the Amercoat Company and has characteristics as described in Exhibit D. This pipe has been extensively used in the Erie Division of Hammermill Paper Company on spent pulping liquor service for many years and is completely corrosion resistant.

The cement and temporary bridge plug will be drilled out after the cement has had time to set. Protectors will be used for the drill string tubing so the fiberglass surface will not be scuffed when the plug is removed.

Other data on the drilling of the well and its construction is detailed in the exhibits listed above.

PRECAUTIONARY PROVISIONS FOR FUTURE OPERATIONS - It is believed that the improved design and materials used in the construction of No. 3 disposal well will preclude any problems such as occurred with

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No. 1 well. However, certain precautionary provisions are planned for the future. These include:

1. Continuous recording of the injection pressure
2. The best-known well construction materials and techniques have been used.
3. A stainless steel landing nipple has been installed to provide a permanent seat where a retrievable wire line plug can be set to seal the pressure formation in the event this ever becomes necessary.
4. Line desurging equipment to absorb the shock and pulsations to the wellhead from the injection pumps will be provided at the discharge of the high pressure injection pumps.

III SUMMARY AND CONCLUSION

Hammermill Paper Company's deep well disposal system has proven to be an efficient and adequate disposal facility.

The criteria necessary for a safe and efficient disposal well will be met in No. 3 well. Indications are that this well will serve as an effective disposal facility, and the injected waste will in no way pollute the aquifers or streams of the commonwealth.

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Adequate surface treatment facilities have been developed during operation of No. 1 and No. 2 wells. The surface treatment operation consists of the following procedures:

1. Collection of the wastes in storage tanks to allow for continuous operation of the disposal facilities.
2. Pumping and blending of the wastes followed by filtration on a precoated leaf type pressure filter.
3. Final filtration of the clarified effluent through a polishing type filter prior to injection.
4. Injection by means of positive displacement high pressure plunger type triplex pumps.

It is the conclusion of our consultants and of the professional staff of Hammermill Paper Company that No. 3 disposal well will provide desirable reserve injection capacity. On this basis, we believe that a permit should be issued for the use of No. 3 well for disposal of spent pulping liquors.

Charles C. Hassell
Pennsylvania Registered
Professional Engineer



Charles C. Hassell
May 27 1968

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JUN 27 1968

REGION III

June 25, 1968

Registered Mail

Mr. Wayne C. Bellaman
Regional Engineer
Commonwealth of Pennsylvania
Region Office III
996 South Main Street
Meadville, Pennsylvania 16335

Dear Mr. Bellaman:

This letter is in reply to Mr. Allender's letter of June 20, 1968 to Dr. Brown requesting certain revisions and/or corrections in our application for a permit for No. 3 deep disposal well, dated May 24, 1968. Some of the questions were covered in my letter of June 6, 1968 on No. 1 disposal well but the material is repeated here for completeness. The items discussed are in the order listed by Mr. Allender.

I (a) The amount of spent liquor available for disposal has averaged 574,000 gallons per day over the last three accounting periods. It is expected to continue at approximately the same level. When No. 3 well operation begins the spent liquor will be injected into No. 1 and No. 3 well while No. 2 well is reconditioned. When all three wells are in operation the liquor will be distributed among the wells. With both No. 2 and No. 3 well being capable of receiving all of the spent liquor, operation of individual wells will be developed by actual experience.

(b) The well logs showed all the strata below the Bass Island formation to be impervious and not capable of being injected with liquor. The well casing goes down to 2,181 feet and when it was set in acid resistant concrete a five foot plug was formed in the well at the end of the casing. The plug was not drilled out and blocks further flow down the well. The well is open through the balance of the Lockport Formation and into the Clinton Formation. The well logs showed that the Lockport would accept little or no spent liquor and the Clinton is impervious to liquor. Both the Lockport and Clinton would be acceptable as injection horizons if they would accept liquor since they are bounded by impervious layers above and below. It is desirable to have a hole below the formation so that any debris that may arise can fall to the bottom and not effect the injection horizon.

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(c) An earthen dike will be built around No. 3 well to retain spent liquor should there be a leak or backflow from the well. A portable pump has been made available for pumping any accumulation of spent liquor inside the dike to collecting tanks pending ultimate disposal. It would be added to the effluent going to further treatment when such facilities are available.

(d) Arrangements are being made to divert the 100-150 gallons of spent liquor vented on startup of No. 2 well to the general mill outfall in Motsch Run where it would join the other effluent streams. In the future, this waste will be included in the mill effluent that is given subsequent treatment.

III. (a) We are currently keeping records on the amount of spent liquor injected into wells 1 and 2. The records will be extended to cover No. 3 well when it starts up.

(b) The injection tubing has been cemented into the hole so it is impossible to install a landing nipple at the 60 foot depth. A stainless steel landing nipple has been installed at 1,580 feet to provide a permanent seat to which a retrievable wire line plug can be dropped from a wire line truck. Lowering time to the 1,580 foot depth will be less than 5 minutes. Since the casing failure in the No. 1 well was at 900 feet, our consultants from Dow Chemical Company tell us the plug should be set as close as possible to the top of the Bass Island formation.

(c) Recorded data on the travel of the spent liquor into the Bass Island formation is limited. When well No. 2 was drilled, no trace of spent liquor from well No. 1 was found. When well No. 3 was drilled, approximately 625 feet from well No. 2, a small amount of spent liquor was found at 1,690 feet near the bottom of the Bass Island formation. (See Exhibit E of the report accompanying the permit application.) Material provided with the original No. 1 well application dated June 10, 1963 (Exhibit A and B attached) provides the best answer as to the probable rate of travel into the Bass Island formation.

(d) The statement in the Completion Report that the Bass Island formation is better developed than in wells 1 and 2 is a reference to the greater porosity of the Bass Island formation at No. 3 well as shown by well logs. (See the Density log and Nuclear log Exhibit G in the application.) This greater porosity is borne out by the lower injection pressures found in the injection test after acidizing No. 3 well.

(e) 2,100 barrels of water were pumped into No. 3 well in a 1 hour and 34 minute injection test after acidizing on May 23, 1968. The injection test showed that the pressures required were less than in wells 1 and 2. Injection pressure on No. 2 well was checked during the injection test. There was no change in the injection pressure on No. 2 well.

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June 25, 1968

(f) The fiberglass injection pipe is coated with sand to provide a good bond with the cement which completely fills the space between the fiberglass injection pipe and the well casing. The fiberglass injection pipe has a tensile strength of 80,000 lbs., and the threads a tensile of 54,000 lbs. plus. The bursting strength at 80°F. is 9,000 lbs. (Exhibit D of the report accompanying the permit application) The cement filling the space between the injection pipe and the casing will support the pipe and would provide a higher bursting strength for the pipe cement combination. Also, the cement supports the fiberglass tubing in a verticle direction. In addition, the injection pipe is supported by a 6 inch Nominal 316 stainless steel hanger with Teflon packing at the surface of the well.

(g) The same pipe has been used for years in the pulp mill in spent liquor service and no deterioration has been observed. But, should the pipe fail it could be drilled out with a drill rig and new pipe installed.

(h) We do not expect failure of the fiberglass injection pipe. The well will be monitored and any sudden change in pressure, especially a drop in pressure, will be a warning that should be checked.

(i) It is not known at this time just what the operating sequence of wells No. 2 and No. 3 will be. Use of the wells could be alternated or both could be used at the same time. An operating pattern for the two wells and well No. 1 will have to be worked out by experience. There was no change in injection pressure in No. 2 well during the injection test on No. 3 well so no pressure buildup may be encountered. If the injection pressure on No. 3 well continues to be lower than No. 1 and No. 2 wells, it will probably be used more frequently.

No evidence of pressure buildup in the formation has been seen during the four years of operation of the deep well system. We do not anticipate any problem in this respect with No. 3 well.

If there are any further questions or comments, please contact Dr. Brown or me. We appreciate the effort you are making to expedite the permit application.

Very truly yours,

HAMMERMILL PAPER COMPANY

Charles C. Hassell
Charles C. Hassell
Pennsylvania Registered
Professional Engineer

Attachments

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